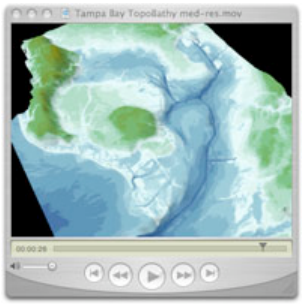
# Tampa Bay Fly-Through
# Teachers Guide

*U.S. Geological Survey*
*St. Petersburg, FL*

**Background**

Imagine what the earth would look like without the oceans and bays filled with water. Take a look at the Tampa Bay map (hotlink to blank map) to see what this would look like. The topography (land elevations) and bathymetry (water depth measurements) are merged to make one map. You can see the shape of the land above and below the water line. Shallow water is light blue. Low elevation land is white. Today's shoreline is between white and light blue (0 meters Mean Sea Level)




**Objectives**

Students will gain an understanding of the underlying physical structure, topography bathymetry, and shoreline in the Tampa Bay area. They will also be more familiar and oriented with natural and manmade features of the area. Students will practice map labeling, contour drawing, and perform unit conversions with a calculator.

Helps fulfill Grades 3-5 Sunshine State Standards (link to separate pdf file for this section)

**Sunshine State Standards for Tampa Bay Fly-Through Activity**

**Math 3-5: Measurement**

Standard 2:
The student compares, contrasts, and converts within systems of measurement (both standard/nonstandard and metric/customary). (MA.B.2.2)

-Students will convert meters (depth of water or elevation) to feet.

**Science 3-5**: **Processes that Shape the Earth**

Standard 1:
The student recognizes that processes in the lithosphere, atmosphere, hydrosphere, and biosphere interact to shape the Earth. (SC.D.1.2)

Example: Atmospheric processes, such as snow or rain, end up on the earth surface in the form of lakes, rivers, streams, oceans, and glaciers (hydrosphere) which are vital habitat for species (biosphere). These processes alter the surface of the earth by moving material and energy from one location to another.

3. knows that the water cycle is influenced by temperature, pressure, and the topography of the land.

Example: A decrease in temperature and pressure will cause condensation, leading to precipitation as snow, ice, hail, or rain, which falls on land and eventually ends up in the ocean. For example, snow will fall on the tops of mountains; melt into streams which merge into rivers and flow to the ocean. Water and sediments move from high elevation to low elevation, much like sand through an hourglass or fluid through a funnel.

**Social Studies 3-5: People, Places, and Environments [Geography]**

Standard 1:
The student understands the world in spatial terms.
(SS.B.1.2)

-Students understand how to read maps and analyze the spatial organization of places and environments. In this lesson students will gain an understanding of Tampa Bay, how the shape of the land and the flow of water create the landscape in which we live.

1. uses maps, globes, charts, graphs, and other geographic tools including map keys and symbols to gather and interpret data and to draw conclusions about physical patterns.

-Students will use the fly through video to understand the landscape (topography and bathymetry) and make interpretations about the water cycle and watershed based on their observations.

Standard 2:
The student understands the interactions of people and the physical environment.
(SS.B.2.2)

-Creation and use of shipping channels is an example of the interactions of people and the physical environment. Think of how people may influence the landscape and environment of Tamps Bay. A healthy and productive estuary supports fish populations that in turn support fishing activities and food supply for human populations. But people generally live on dry land, so it is important to understand why some areas are covered in water and why some areas are dry.

2. understands how the physical environment supports and constrains human activities.

-Students should understand how topography and bathymetry relates to human activity and population distribution. Tampa Bay supports an urban population economically through shipping, recreation, fishing, agriculture, and tourism. Low lying areas pose a flooding hazard and constrain choice of location for development. Shifting of beach material poses another hazard and could constrain development. Fertile floodplains may be devoted to agricultural lands. Deeper water depths permit the safe movement of large ships. Shallow water on sandy shores are attractive areas for recreation. And so on.

3. understands how human activity affects the physical environment.

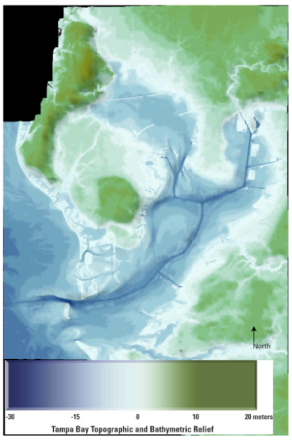
-Dredged shipping channels, bridges, and beach high rises are construction examples. Water withdrawal on a river changes the amount of water that goes to the estuary. Water over paved surfaces flows faster to the estuary than water through a forest.

**Teacher Guide to Tampa Bay Fly-Through**
**Florida Shelf Summary**

One of the broad goals of U.S. Geological Survey FLaSH Map project program is to bring scientific information about our coastal and marine resources directly to the public. Educational activities are designed to help integrate scientific information and methods into everyday classroom procedures. Teachers are encouraged to adjust lesson plans to address current events and individual classroom needs.

**Materials**

- Computer internet link to FLaSH Map website with the Tampa Bay Fly-Through ready to run
- Student copies of Tampa Bay Fly-Through map (PDF)
- Teacher copy of Tampa Bay Fly-Through map with labels (PDF)
- General map of Tampa Bay area with features (Map Quest or foldout street map)
- A calculator for converting units if students cannot multiply with decimals.
- Blue and Red Markers/Crayons




**Methods**

This is a teacher-guided activity using a fly-though video of Tampa Bay to explore the terrain of the region. Students label geographic features and draw contour lines on their own maps. A teacher-guided discussion deals with watersheds, shorelines, shipping routes, and unit conversion. Below are two lists to help guide the lesson.

**Things and places to label**

City of Tampa
Your school location
St. Pete Beach
Bridges
ship channel
Hillsborough County
Ruskin County
Pinellas County
Interbay Peninsula
Hillsborough Bay
Old Tampa Bay
Little Manatee River
Safety Harbor
Palm Harbor
Treasure Island
Fort de Soto
Campbell Causeway
Hillsborough River
island of St. Petersburg
Gulf of Mexico
Tampa Bay

**Vocabulary terms**

bay
wetlands
mangroves
sea grass
bayou
estuary
bathymetry (water depth measurements)
topography (land elevations)
elevation
mean sea level
watershed
water cycle
shoreline
contour (line of equal elevation or equal depth)
peninsula
barrier island
compass directions: east, west, north, and south
sounding

**Activity**

Before you fly, take a look at the colors of Tampa Bay on the computer or website. Deep water is dark blue. (This also looks great printed in black and white). Find the ship channel. Highest points of land are between 10-20 meters above mean sea level. They are colored dark green. Find and label the "island of St. Petersburg". Find and label the city of Tampa. Low elevations along the coast are white. Find and label the Hillsborough River.

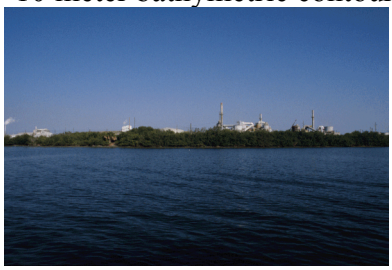
❖ Ask students to highlight or mark features as the fly-though progresses on the unlabeled map. Give students a list of features to label

❖ Your fly-through will start over the Gulf of Mexico at the entrance to Tampa Bay. Fly east over the ship channel. As you fly toward Hillsborough County, your plane turns to look west from Ruskin to Pinellas County. Pause to look down the Little Manatee River into Tampa Bay. Next fly north over Hillsborough County and turn to look south over the city of Tampa. Notice how the Interbay Peninsula divides Tampa Bay, Hillsborough Bay, and Old Tampa Bay. As you fly out to the coast notice the elevation difference between Safety Harbor and Palm Harbor. Now you'll find yourself over the Gulf of Mexico again, looking east across Pinellas County. Notice the barrier islands where the beach communities, such as Treasure Island, are located. Your tour ends as you pass over Fort de Soto and return to normal map-view with north at the top.

❖ If students have seen the movie, ***Finding Nemo***, they may recall how all water flows to the ocean. Invite a discussion on rivers, estuaries, the Gulf of Mexico and other oceans. Introduce the vocabulary term: watershed.

❖ Discuss and mark the location of your school, neighborhoods, and other cultural features. Did you notice the low-lying bridge, Campbell Causeway, crossing Old Tampa Bay? Did you notice a creek or bayou running from Old Tampa Bay to Treasure Island? What else was interesting about the fly-through?

❖ Introduce vocabulary such as elevation, topography, mean sea level, water depth and bathymetry Ask students to draw a blue line at current mean sea level (0 meters). What would change if the water level was higher? Draw a new line in red along the 10-meter contour. What would change if the water level was lower? Draw a new line in blue at the -10 meter bathymetric contour. These lines can be visually estimated.



❖ Unit conversions: to convert meters to feet multiply by 3.28 (use calculator if necessary). Discuss use of metric units by scientists. Explore the concept of international

standards. Start with 1 meter. How many feet are in one meter? Then 10m, -10m and 20m.

❖ Define the draft of a boat. A boat's draft is measured from the bottom of the hull to the water line. How will the draft change if the boat is empty and then filled with supplies? How do water depths on a map help boaters to choose safe routes?

❖ Discuss the utility of bathymetric soundings for boating and ship traffic. Large ships must stay within dredged shipping channels because the seafloor outside these areas is much too shallow. Ships must be careful to stay within channel markers and constant monitoring and measuring is necessary to make sure these channels don't fill in with sediments, making shipping difficult and dangerous. On rare occasions, shallow sand bars may actually save the day. The pilot of a 374 foot vessel that was drifting too close to the Sunshine Skyway Bridge guided the boat into a sandbar instead of risking a collision with the bridge. See the article for a current events discussion. http://www.sptimes.com/2007/03/28/Tampabay/Pilot__It_was_safer_t.shtml

❖ Find out how topographic and bathymetric maps are made. Do scientists and surveyors use different equipment for each type of map? Why?

Visit the DLESE website (http://www.dlese.org/library/index.jsp) for in-depth lessons in bathymetry and topography, such as "Mapping Potato Island": http://www.windows.ucar.edu/tour/link=/teacher_resources/teach_taterland.htm